

Hans B. Kief, NC/CNC Handbuch '95/96 – NC, CNC, DNC, CAD, CAM, FFS, SPS, NC-Maschinen, NC-Roboter, LAN -- Fachwortverzeichnis, 1995/96, Carl Hanser Verlag, München, Wien [*Hans B. Kief, NC/CNC Handbook'95/96 – NC, CNC, DNC, CAD, CAM, FFS, SPS, NC-Machines, NC-Robots, LAN -- Technical Word Glossary, 1995/96, Carl Hanser Press, Munich, Vienna]*]

p. 58 CNC-Computerized Numerical Control

## 2.5 Diagnostic Software

Routines supervising machines' or controllers' operations that are permanently or selectively activated for automatic documentation of errors and their causes. For this purpose the CNC displays measured values on a monitor screen as curves, graphs or in digital form. All data can also be output over communications connections.

## 2.6 Cut Out

The power provided to a continuously turning shaft is halted at the end of a process for a programmable time before the tool is removed.

## 2.7 Manual Input

Manual typing and correction of an NC program using the CNC's keyboard for computer-based programming of a WOP controller by means of graphics and interactive dialogues.

## 2.8 Correction values

Input and stored actual values (thickness, length, radius) that are reviewed by programmed routines for each work piece processed by the machine. Also values for error, zero-offset, or wear compensation and tolerance ranges for the correction values.

## 2.9 Macro

Permanently stored programs for hole punching, boring, threading and milling cycles



which can be supplied with necessary data (parameter values) and called and run as often as wanted. (Also known as parameterized subprograms.)

#### 2.10 Offset

In German usage: electronic compensation of tolerance ranges of work pieces or tools to minimize mechanical setup or adjustment.

#### 2.11 Polar coordinates

Two- or three-dimensional coordinate system for representing angle-dependent functions or angle-related diagrams. Programmed polar coordinates must be converted into Cartesian coordinates for operating machines having linear axes either by programs or in the CNC.

#### 2.12 Position setting

The operator aligns the spindle's mid-point using a timer or other means at a fixed point on the work piece or on the device and displays the axial locations in a diagram or in NC program-defined values.

#### 2.13 Program debugging

Accelerated operation of an NC program with increased input values, or in an emergency, for the purpose of investigating gross program errors, collisions and other problems.

#### 2.14 Reset

A keyboard function that clears all actual values from working memory and zeros all memories. Done only in exceptional circumstances, and then only under the supervision of a service technician.



“Hier spricht Ihre Steuerung” Steuerungstechnik Special Tooling 6/99, Seite 60 ff.  
(This Is Your Controller Speaking -- Control Engineering -- Special Tooling 6/99, pages 60 ff.)

Facilities Controller Automatically Calls Maintenance In The Event Of Trouble.

Voice control of manufacturing automation is not yet state of the art technology. In the meantime, however, there is a solution whereby a non-voice-activated machine can quickly and reliably inform the right people of the location of a problem.

Whenever events that require a fast response occur in a company, in the event of breakdowns and accidents, factory personnel must be notified, often personnel from outside the factory as well. Today, since maintenance and service technicians are “constantly on the road” mobile phones fill an important communications gap. Through a DECT cell phone they are reachable anywhere they are working.

For a long time, the situation in manufacturing was as follows: When a facility or a machine failed, a red light turned on, the troubleshooter came and investigated the cause. However the problem with this is that in this alarm process the trouble is very often first noticed quite late. Then begins first comes the search for the cause of the trouble, replacement parts and tools will be obtained. In brief: It is a lengthy and costly process. Breakdowns can surely be responded to more surely, more quickly and, thereby, more cheaply by the linking of automation and communication technology: The machine controller analyzes the errors and itself immediately notifies the maintenance staff over modern mobile telephones. Along with the plant managers carrying DECT cell phones comes the achievement of greater plant productivity and fast trouble elimination even for stacked alerts. Siemens provides a complete solution for these situations, based on the Hicom E cell phone and the digital alarm and communications server “DAKS for Hicom” – as the link to the central communications systems for Voice and data as well as automation, monitoring and alarm systems.



In accordance with alarm and escalation strategies that were previously determined and stored in data banks, the necessary personnel are automatically called and informed using both text and voice messages, calling one after another, or else many at the same time, as needed. The text message can also be redisplayed on the cell phone's display screen at a later point in time, or on a handheld email device,

In addition to this, by typing on the keys of the cell phone or handheld device, the alerted person can:

- speak with colleagues on a helpdesk who can provide him further information, or
- teleconference with maintenance personnel and engineers from the manufacturer of the failed equipment.

Of course, the digital alarm and communications server DAKS works closely with computers and process controllers, and all of these with the market-leading programmable memory controller from Siemens, the SPS systems SIMATIC S5 and S7. However, it also works with the operating and monitoring systems such as the Siemens WinCC, for example.

The compatibility of these systems in contrast to those assembled from different manufacturers, as well as being designed for different purposes, provides essentially the following advantages for the user:

- An integrated communications infrastructure based on Hicom 300 E, e.g. for cell phone calls, paging, company communications, data communications, email, which are installed and supported by a single "Solution Provider" partner.
- The integration of existing computers and applications software for production supervision and manufacturing technology through existing connections in this integrated communications infrastructure.



The advantages for users: Many can actually be notified simultaneously, they can make decisions as a team and they can obtain qualified help. In the meanwhile, many fixed ideas about convergence are overturned by the cooperation of the communications system with the supervisory and control systems, on many levels: for one, on the level of information processing and communication (I&C); for another, on the level of still more widely separated users. One example from production supervision illustrates the concrete advantages of integrating users.

In manufacturing and processing technology there are upgraded plants that are controlled and supervised by stored-program programmable controllers (SPS). Many of these plants are run without employing operators, particularly SIMATIC controllers that, on the one hand, start off with timely preventive maintenance and, on the other, quickly and reliably provide notice of functional failures and operational problems.

For a long time, these automation systems, which are often already connected to paging systems as well as having communication means provided on site, have had considerable delays in service technicians returning calls. With the new solution, in the event of an equipment failure, a corresponding notice will automatically be produced by the service and supervision systems of that equipment and sent out over the Hicom cell phone system. A code having sixteen characters, which indicate the cause of the problem and the location of the problem is immediately shown on the cell phone display screen viewed by the relevant technician, for example 'R 17-3H 15-3'. In clear text this says that robot number 17 in floor quadrant 3 of room 15 has shown type 3 trouble causation. If the technician takes the call by pressing the answer key, a more detailed text having as many as 150 characters can be automatically displayed. This can include priority information or repair advice. Even automated speech output could be used to provide, preferably in the native language of the listener. In this way, by means of a more informative failure message radioed to the service person that is specific to a failure, the service person can respond to a problem with the right replacement parts and tools already in hand when first



encountering the problem machine. In this way the problem location can be left much more quickly.

Through the use of the Hicom network for signaling it takes only a few seconds to notify the relevant service personnel, from the time the trouble appears to the time it is cleared. Through the use of other technologies for failure signaling, for example SMS-Messaging on GSM hand-helds, depending on the transmission technology, the trouble information may take more than 15 minutes to arrive. This can be prevented by using specific Hicom functions "Forced Interruption of On-going Speech" or "Ignore Call Diversion for Emergency Call" so that the failure message is assured prompt connection to the right person.

The example shows that the use of intelligent alert mechanisms the residual risk of operator-less plants to the company is truly minimized and above all the use of service personnel is optimized in this way.

Telecommunication and information systems are still in their infancy. The digital alarm and communication server "DAKS for Hicom"

- speaks both languages
- forms the bridge (Gateway) between two worlds

in that way, by connecting users, additional advantages will be obtained. The DAKS server, because it uses the communications protocol CorNet-N, is seamless in connecting to the company's internal communication network, so that all connection characteristics of the Hicom communications server and the public telephone network are compatible.

The easiest implementation is in a service and supervision system in which the standard module "Funkserver" (broadcast server) is embedded, which the DAKS-234 server reliably regulates. On the computer side, there is a choice of using either a serial asynchronous connection (RS232 or RS422) or a TCP/IP connection with their respective protocols. For the connection to a production control computer the control



computer protocol is used most often. The Internet protocol SMTP is available as an alternative, by which emails can be sent to the cellular system.

The connection of conventional paging systems can be achieved using the standardized ESPA 4.4.4 protocol. Stored-program programmable controllers can be connected using the SPS protocol, but break-in and fire alarm systems will be triggered. The architecture of similar communications systems also presents no barrier. The first two protocols provide the same alert information in the central host computer. The DAKS server manages the computational work that produces the simple telecommunication language that activates communications functions including the various Hicom characteristics, for example "ring the telephone alarm tone" or "Switch off an on-going conversation".

The connections (ESPA and SPS) behave in the opposite way. The central system provides either only an event number, or textual information and the number of one of the predefined alarm groups. The alarm intelligence is then wholly in the Hicom communication server or in the DAKS server. With the DAKS server, computers and stored-program programmable controllers can supply far more than a little red light on a supervisor's panel. DAKS puts out trouble messages and calls for the right assistance at the right time – if something's burning, it even calls for the fire department.

p. 62 Guenter Baum Product manager of Siemens AG, Workplace Information and Communications Networks, Munich.

Stored-program programmable controllers and alarm systems can now automatically call for help.

In accordance with alarm and escalation strategies that were previously determined and stored in data banks, the necessary personnel are automatically called and



informed using both text and voice messages, calling one after another, or else many at the same time, as needed.

p. 64 The process controller or alarm system calls for help lightning quick over DECT or GSM handhelds. A broadcast server in the equipment controller communicates with the DAKS server that is connected to the communications system, for this purpose.

Through the use of other technologies for failure signaling, for example SMS-Messaging on GSM hand-helds, depending on the transmission technology, the trouble information may take more than 15 minutes to arrive. The DAKS server responds immediately.

p.65 Using these principles, the new DAKS server from Siemens provides a bridge between two worlds, that of process control and that of communications systems. Internal and external alarming can be implemented wholly automatically and without loss of time in this way.



## Keyboard Code

The invention relates to a process and a device for secure processing and/or transmission of digital data, especially when networked computer systems are involved, wherein data entered in at least one computer system is subjected to a cryptographic process before the data are further used within the computer system.